Distinguishing Subgroups in Opposition to Infant Immunization: Results From the *Listening to Mothers III* Survey

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ABSTRACT

Objective: To investigate factors associated with parental intention of refusing or altering their child's vaccination schedule. **Methods:** Data were from the 2011–2012 Listening to Mothers III survey ($N = 1,053$). Weighted bivariate and multivariate analyses examined factors related to refusing or altering vaccination. **Results:** 3.2% of mothers planned to refuse vaccination and 12.3% preferred to alter the recommended schedule. Preference to refuse was associated with maternal age <25 years (AOR 4.33; 95% CI: 1.18, 15.9), prior refusal of maternity care (AOR 6.04; 95% CI: 1.88, 19.4), and living outside of the Northeast. Schedule modification was only associated with prior refusal of care. **Conclusions:** Mothers preferring not to immunize their children and those wishing to alter the vaccination schedule represent two distinct groups.

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INTRODUCTION

In the United States, the persistence of childhood vaccination opposition by a significant subpopulation has remained a concern to the public health community (Dube, Vivion & MacDonald,

2015). Studies have identified multiple factors (e.g., ideology, age, education) (Gowda & Dempsey, 2013; Siddiqui, Salmon, & Omer, 2013; Dempsey et al., 2011) related to vaccination opposition, but have generally not distinguished between complete opposition and desire to modify the schedule of vaccinations. They have also generally not accounted for regional or ideological differences in parents' perspectives toward immunization. Such information would be helpful for clinicians who play critical roles in parental decision making about vaccine use, and

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is especially timely given recent data suggesting that more than 1 in 10 parents refuse or delay specific vaccinations for their children (Dempsey et al., 2011; Lieu, Zikmund-Fisher, Chou, Ray, & Wittenberg, 2016). Therefore, the purpose of this study was to investigate, using nationally representative data, a wider range of sociodemographic and attitudinal factors associated with parental intention of refusing or altering their child's vaccination schedule.

METHODS

Data were drawn from the *Listening to Mothers III* (LTM III) survey (Declercq, Sakala, Corry, Applebaum, & Herrlich, 2014), which was developed by Childbirth Connection in collaboration with Boston University School of Public Health and Harris Interactive. The core LTM III survey contains responses 2,400 women who gave birth in U.S. hospitals between July 2011 and June 2012; our analyses focus on data from 1,053 women who completed the follow-up postpartum survey, conducted January through April 2013 among the same sample. The complete survey results were weighted by Harris Interactive using a proprietary weighting system, resulting in a sample population that was representative of all U.S., English-speaking mothers aged 18 to 45 who gave birth to a singleton baby in a hospital in 2011–2012 (Declercq et al., 2014). Because of the slightly different demographic makeup of initial and follow-up survey participants, separate weighting systems were developed for results of the two surveys. These analyses were determined to be exempt from institutional review board review as the data are de-identified and publicly available.

Our primary outcome of interest was maternal response to the question: "Which statement best describes your approach to immunizations ('baby shots') with your baby born (date)?" The response options were: "I prefer to get all immunizations according to the recommended schedule"; "I prefer to modify the recommended approach, for example, by delaying some immunizations or avoiding combined immunizations"; and "I prefer not to have my baby immunized." Maternal characteristics (Table 1) included age, race/ethnicity, primary source of payment for maternity care services, education, and U.S. region of residence. We also examined responses to three attitudinal questions assessing the mothers' political ideologies ("How would you describe your own political philosophy?"), opinions of maternity care quality ("Overall, how would you rate the quality

of maternity care in the U.S.?"), and history of refusing any maternity care service ("At any time during the hospital stay for your recent birth, did you refuse to accept any care that a nurse, doctor, or midwife offered to you or your baby? 'Care' includes anything that might be done or given to either of you or that you were asked.").

Analyses were conducted using survey procedures from SAS version 9.4 (SAS Institute, Cary, NC) to account for LTM III's sample design. All results are based on weighted counts. We used summary statistics to describe sample characteristics and chi-square tests to examine differences among maternal characteristics by their anticipated immunization approaches. We then used multinomial logistic regression models to examine associations of maternal characteristics with immunization preference. Mothers who preferred to get all immunizations according to the recommended schedule comprised the reference group. Multinomial models included characteristics significantly associated with vaccine intention in bivariate analyses to allow for the most parsimonious model.

RESULTS

Table 1 presents the sample characteristics. In the overall sample, 3.2% of mothers preferred to avoid immunizations and 12.3% preferred to modify the recommended schedule. Mothers who preferred to avoid immunizations for their babies ($N = 33$) were most likely to be <25 years of age (5.9%), non-Hispanic White (4.6%), politically conservative (6.8%), and living in the Western region of the United States (6.6%). Among mothers from the West who self-identified as conservative, 16.5% reported a preference to avoid immunizations (data not shown). Mothers who reported a preference to modify the recommended immunization schedule ($N = 128$) were mostly likely to be ≥ 35 years of age (14.2%), on

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TABLE 1

Sample Characteristics Among Mothers by Immunization Intention

Which Statement Best Describes Your Approach to Immunizations ("Baby Shots") With Your Baby Born (Date)?	N (%)	Not to have My Baby Immunized	To Modify the Recommended Approach	To Get All Immunizations According to the Recommended Schedule	χ^2 p-Value
Total	1,047 (100)	33 (3.2)	128 (12.3)	885 (84.6)	
Age					
<25	330 (31.6)	5.9	11.3	82.7	.011
25–34	552 (52.7)	1.7	12.2	86.1	
35+	165 (15.7)	2.7	14.2	83.1	
Race/ethnicity					
Non-Hispanic White	584 (55.8)	4.6	13.0	82.4	.037
Non-Hispanic Black	152 (14.5)	1.6	13.7	84.7	
Non-Hispanic Other Race	72 (6.9)	1.4	15.7	82.9	
Hispanic	239 (22.9)	1.3	8.6	90.1	
Payer Source					
Public/Medicaid	538 (51.4)	3.9	10.1	86.0	.044
Private Insurance	509 (48.6)	2.4	14.5	83.1	
Education					
High School or Less	425 (40.6)	3.4	10.2	86.4	.051
Some College	309 (29.5)	3.0	9.6	87.4	
College Graduate	223 (21.3)	2.7	17.6	79.7	
Graduate Degree	90 (8.6)	4.0	17.6	78.5	
Political Ideology					
Conservative	291 (27.8)	6.8	13.3	79.9	<.001
Moderate	466 (44.5)	2.2	10.2	87.7	
Liberal	290 (27.7)	1.2	14.5	84.3	
Quality U.S. Maternity Care					
Fair/Poor	174 (16.6)	4.5	18.2	77.3	<.001
Good/Excellent	873 (83.4)	1.7	13.8	84.5	
Ever Refused Care in Hospital					
Yes	220 (21.0)	9.2	20.8	70.0	<.001
No	827 (79.0)	1.6	10.0	88.5	
Region					
Northeast	157 (15.0)	0.3	11.5	88.2	0.01
Midwest	245 (23.4)	2.5	15.6	82.0	
South	403 (38.5)	2.7	10.4	86.9	
West	241 (23.1)	6.6	12.4	81.0	

Note. Numbers in the tables are weighted percentages. Percentages may not total 100 due to rounding.

private insurance (14.5%), college graduates (17.6%), liberals (14.5%), and living in the Midwest (15.6%). Both groups were more likely to believe their maternity care quality was fair or poor (versus good or excellent) and report having previously refused some type of maternity care.

In multinomial analyses (Table 2), preference to avoid immunizations was associated with maternal age <25 years (AOR 4.33; 95% CI: 1.18, 15.9), prior refusal of maternity care (AOR 6.04; 95% CI: 1.88, 19.4), and living outside of the Northeast. Schedule modification was only associated with prior refusal of care (AOR 2.84; 95% CI: 1.48, 5.45).

DISCUSSION

In this nationally representative sample, mothers preferring not to immunize their children and those wishing to alter the immunization schedule represented two distinct groups. Mothers who preferred

Our findings suggest that targeted efforts to recognize distinctions in characteristics of parents who oppose immunization as opposed to wanting to alter the immunization schedule may be central to efforts to improve childhood vaccination rates.

TABLE 2

Results From Multinomial Logistic Regression

	Maternal Immunization Preference	
	No Immunizations	Modify Schedule
Age		
<25	4.33 (1.18, 15.9)	0.94 (0.47, 1.87)
25–34	1.00 (reference)	1.00 (reference)
35+	2.54 (0.59, 10.9)	1.31 (0.62, 2.77)
Race/ethnicity		
Non-Hispanic White	1.00 (reference)	1.00 (reference)
Non-Hispanic Black	0.21 (0.02, 2.44)	1.42 (0.57, 3.53)
Non-Hispanic Other Race	0.23 (0.02, 2.69)	1.23 (0.34, 4.37)
Hispanic	0.13 (0.02, 0.86)	0.65 (0.31, 1.40)
Payer Source		
Public/Medicaid	1.00 (reference)	1.00 (reference)
Private Insurance	0.43 (0.15, 1.20)	1.40 (0.75, 2.61)
Political Ideology		
Conservative	2.88 (0.94, 8.81)	1.35 (0.70, 2.63)
Moderate	0.83 (0.21, 3.32)	1.76 (0.93, 3.36)
Liberal	1.00 (reference)	1.00 (reference)
Quality Maternity Care		
Fair/Poor	1.09 (0.29, 4.15)	0.62 (0.30, 1.25)
Good/Excellent	1.00 (reference)	1.00 (reference)
Ever Refused Care		
No	1.00 (reference)	1.00 (reference)
Yes	6.04 (1.88, 19.4)	2.84 (1.48, 5.45)
Region		
Northeast	1.00 (reference)	1.00 (reference)
Midwest	11.73 (1.59, 86.6)	1.46 (0.65, 3.28)
South	10.41 (1.31, 82.6)	0.96 (0.43, 2.16)
West	34.31 (4.99, 235.8)	1.16 (0.49, 2.75)

not to have their babies immunized tended to be from the West, younger and of conservative political ideology and reported refusing care at some point in their hospital stay, whereas mothers who preferred a modified schedule were generally similar to mothers who followed the vaccination schedule with the exception of a greater likelihood to have refused care.

Although we were unable to assess actual immunization behavior, our exploratory findings indicate that efforts to improve immunization rates may need to consider different approaches to each group. Importantly, refusal of care in the hospital may indicate that these mothers are more likely to refuse preventive care for their children and could indicate the need for a specified counseling approach that accounts for their needs and preferences. Likewise, the notable regional and ideological differences suggest a possible need for targeted education efforts in the Western United States and may provide support for the recent AAP call for elimination of nonmedical exemptions for immunizations prior to school

entry (Simon, Byington, Diasio, Edwards, & Holmes, 2016).

Childhood vaccination hesitancy and opposition are increasingly important issues in the United States, abetted by the new President's unclear stance on the issue (Trump's Vaccine-commission, 2017). Our findings suggest that targeted efforts to recognize distinctions in characteristics of parents who oppose immunization as opposed to wanting to alter the immunization schedule may be central to efforts to improve childhood vaccination rates.

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DISCLOSURE

The authors have no relevant financial interest or affiliations with any commercial interests related to the subjects discussed within this article.

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